

from France in the fifteenth century. History always repeats itself in similar cases. But Japan will have done her work well, and the notes made by Nishi Tokujiro in his journey twenty-five years ago would have shown us then, had we had ears to hear or eyes to see, that already Japan was studying the huge continent at her door, and weighing the possibilities that might come forth from it in the fulness of time.

It remains only to say that the book is "bound" only in paper covers, and falls to pieces directly it is cut. We presume that Italians send their books to the binders before they read them. L4.50 seems a high price for a book of 300 pages that has no binding and no illustrations. Unlike the French, the Italians understand the value of an index, and this book has a good one.

LUCIANI'S HUMAN PHYSIOLOGY.

Human Physiology. By Prof. L. Luciani. Translated by Frances A. Welby. Edited by Dr. M. Camis. With a preface by Prof. J. N. Langley, F.R.S. In two vols. Vol i., Circulation and Respiration. Pp. xiv+592. (London: Macmillan and Co., Ltd., 1911.) Price 18s. net.

THE rapid progress in the science of physiology makes it increasingly difficult for any single individual to give a comparatively complete presentation of the whole subject. In consequence of this fact, the larger text-books are usually written by several authors. While there are many advantages in this method, a loss of unity in the treatment of the subject inevitably results. Luciani's work gives a more detailed account of the subject than the majority of text-books of single authorship, and thus occupies a place intermediate between the larger works and those of moderate size.

The arduous labour of translation has been carried out very efficiently, the English version being clear, accurate, and eminently readable. The translator has also had the advantage of the assistance and advice of Dr. Aders-Plimmer on chemical subjects, and of Mr. W. L. Symes on many technical difficulties. The references to the literature of the subject appended to the various sections of the work form a very useful feature. The editor, Dr. M. Camis, has rendered these more complete by the addition of the chief recent English and American physiological papers. These references will undoubtedly offer valuable guidance to senior students of physiology desirous of extending their knowledge of physiology beyond the limits of their text-books.

The present volume, which extends to 600 pages, deals with the general physiology of living matter, the physiology of blood, the circulation, respiration, and lymph.

The introduction gives a brief but masterly account of the general objects and domain of physiology. The first three chapters deal with the structural features, the chemical and physical basis of living matter, its fundamental properties, and the conditions by which it is influenced. The third chapter closes with an interesting account of the hypotheses of Pflüger, Hering, and Verworn regarding the nature of

the processes which take place in living substance.

The fourth chapter deals with the formed constituents of blood. The historical development of the subject is excellently epitomised. The general physico-chemical characters of the blood as a whole are next described. A brief account of the methods used in determining the rate of coagulation might have been added with advantage. The morphological elements of blood are then described. The plate showing absorption spectra is somewhat diagrammatic, methæmoglobin and acid hæmatin being represented as having identical spectra.

An excellent account of the chemical and physical properties of blood plasma, and of the theories of its coagulation, forms the main subject-matter of chapter v. The chapter concludes with an account of the effects of bleeding, transfusion, and the bactericidal and immunising properties of blood.

An exceptionally detailed account of the historical development of our knowledge of the circulation of the blood is given in chapter vi. The author ascribes the discovery of the true course of the circulation to Cesalpinus rather than to Harvey, differing in this respect from the large majority of physiologists. In the preface to this volume, Prof. Langley has given the chief reasons for critical caution in studying Prof. Luciani's views on this subject.

The mechanics of the heart and blood flow are fully discussed in chapters vii. and viii. The discussion of the myogenic and neurogenic theories of cardiac rhythm given in chapter ix. offers an excellent example of the author's skill and impartiality in presenting the evidence for and against rival views. The account given embodies the most recent work on the subject, including that of Carlson on *Limulus polyphemus*.

Chapter x. provides an excellent account of the vaso-motor nervous mechanism. Chapter xi. is devoted to the chemistry and physics of respiratory exchanges. A most interesting review of the historical development of the subject is given, both from the chemical and physiological points of view. A description of Haldane's method for determining the oxygen capacity of blood might have been appended to the account of the methods for the extraction of the gases of the blood.

The nervous and chemical control of respiratory rhythm form the subject-matter of chapter xiii. Some interesting recent observations by Italian workers, throwing new light on the mode of production of certain forms of polypnœa in muscular work, are recorded. A somewhat fuller discussion of recent views on the chemical regulation of respiration would have been welcome.

The present volume concludes with an excellent account of the physiology of lymph and lymphatic organs.

The book is singularly free from errors; yet in a text-book of this extent minor errata inevitably occur. The following may be mentioned with the view of aiding to some extent in the preparation of a table of errata. On p. 25 "cornea" is used instead of "stratum corneum"; on p. 109 "carbon bisulphide"

should be replaced by "ammonium sulphide"; on p. 333 "afferent" by "efferent"; and on p. 415 "inspiratory" by "expiratory."

The present edition is a distinct advance on the earlier issues, the more recent additions to physiology being fully given. Such are some of the chief characteristics of this book. So brief a review as the foregoing necessarily leaves unmentioned many other important features. The book is a remarkable achievement, especially in view of the fact that it is the work of a single author, and appears to the reviewer to possess special qualities and merits, which entitle it to a high place amongst the existing English text-books of physiology. The issue of the remaining three volumes will be eagerly awaited by all who have studied the present volume.

ABBE'S THEORY OF IMAGE FORMATION IN THE MICROSCOPE.

Die Lehre von der Bildentstehung im Mikroskop von Ernst Abbe. Edited by Otto Lummer and Fritz Reiche. Pp. xii+108. (Braunschweig: F. Vieweg und Sohn, 1910.) Price 5 marks.

AN account of Abbe's theory of the microscope image given by so distinguished an optician as Prof. Lummer cannot fail to arouse a large amount of interest among all students of optical theory, as well as among workers with the microscope. It demands the more attention in that it is professedly a reproduction of Abbe's theories as propounded by himself. Lummer tells us that in the winter of 1887, in company, among others, with Winkelmann, Czapski, Rudolph, and Straubel, he attended a series of lectures given by Abbe in Jena, and it is clear that he enjoyed exceptional opportunities of becoming acquainted with Abbe's views and his manner of regarding microscope theory.

The work, we are told, is founded solely on the carefully preserved notes of these lectures. One question only, it was thought, needed to be reviewed from the modern point of view: Is the Fresnel-Huyghens secondary-wave interference theory a satisfactory basis for the discussion of the phenomena, or will the more modern theory of Kirchhoff and Maxwell lead to some modification of the conclusions arrived at? It may be answered at once that Lummer attacks the problem of image formation by limited beams from the latter point of view, and shows that it leads to identical results with the former.

The intrinsic interest of the book is very great, and the methods employed are most instructive, both in the establishment of general principles and in their application to the special cases which arise in microscope imagery when periodic structures are viewed by transmitted light. Thus, in the latter case, the determination of the distribution of light intensity in the image plane requires an integration over the plane of the structure viewed, and over that of the actual or virtual aperturæ. By variation of the order of integration the authors are able to bring out clearly the part played by the different "diffraction spectra" in the formation of the image. The

same thing is shown in a different manner more fully, and still more clearly, in Lord Rayleigh's well-known paper of 1896, "On the Theory of Optical Images, with special reference to the Microscope."

The special cases here dealt with are those of a single luminous slit, two parallel slits, self-luminous or viewed by transmitted light, and a single slit of finite breadth, with or without phase difference; finally, in a separate chapter the case of a grating is considered, and the effect discussed of limiting the image-forming rays to certain of the grating maxima. In dealing with images formed by transmitted light, the case of oblique illumination is also treated. The source of light is supposed either at a finite or infinite distance, but, as might be anticipated, there is no special discussion of the case of "critical" illumination. Throughout, the treatment is not for a circular aperture, but an aperture of special form is assumed to simplify the integration.

The main interest of the volume, however, lies in the light it throws on the manner in which Abbe derived his well-known theory. From this point of view we must confess that we find the book a little disappointing. It is not easy to agree with Prof. Lummer as to the necessity, or even the desirability, in this book, of devoting space to showing how far the older theory is in agreement with more modern views, and this is not the only feature which tends to produce a sense of uncertainty as to how far the account given can be regarded as a direct reproduction of Abbe's presentation of the subject. What admirer's of Abbe's work would wish to have is a close and faithful transcript of Abbe's own development of the theory, with the minimum of variation from the line of argument he may have followed. The volume is, however, inspired by a true enthusiasm for Abbe's teaching, and a just appreciation of the value of his work, and the future historian of science will be indebted to Prof. Lummer for the trouble he has taken to present in a manner worthy of its origin the material at his disposal.

THE NUTRITION OF THE ALGÆ.

Die Ernährung der Algen. By O. Richter. Pp. viii+192. (Leipzig: Dr. W. Klinkhardt, 1911.) Price 12 marks.

SINCE the appearance in 1905 of the second part of Oltmann's work on the morphology and biology of the algæ, so large a number of memoirs on the nutrition of the algæ have appeared, that Dr. Richter has thought it worth while to collect them into a volume for the *International Review of Hydrobiology and Hydrography*. The references are grouped under three headings—(1) the significance of chemical elements and certain chemical compounds in the physiology of nutrition; (2) the influence of various chemical and physical factors of the nutrient substratum on the form and development of the algæ; and (3) an appendix on the influence of temperature and light on the algæ with reference to their culture.